Dynalec
Airflow Indicator Panel
Model 62413-100

Users Manual

Rev B

For parts replacement or technical assistance, call:

Phone: (315) 483-6923
FAX: (315) 483-2298
Email: sales@dynalec.com or
support@dynalec.com
Internet: http://www.dynalec.com

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Dynalec Corporation
87 West Main Street
P.O. Box 188
Sodus, New York 14551
USA

Airflow Indicator Panel
User's Manual

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Safety Precautions and General Information

This section contains:

- Safety procedures to follow before servicing or adjusting this equipment
- Equipment specifications
- List of qualification tests performed on this equipment
- A description of the front panel of this equipment.

Safety Precautions

During normal operation, there is no danger from high-voltage circuitry. High-voltage circuitry is housed inside the unit, behind a Plexiglas panel.

However, high voltages are present in this equipment.

Remove power before replacing boards or reconfiguring internal wiring.

Live circuits

Operation of this equipment requires the use of high voltages which may be dangerous to life. Operating and maintenance personnel must perform the following when working on any part of the equipment:

1. Before working inside the unit, de-energize the 115VAC primary power to the equipment.
2. Tag the circuit where it is de-energized to warn other personnel so they DO NOT energize the circuit.
3. Discharge and ground circuits after they are de-energized before touching them.

Service restrictions

DO NOT service or adjust equipment alone. Under NO circumstances should any personnel reach into an energized enclosure for any purpose, including servicing and adjustment, without the immediate presence or assistance of another person capable of rendering aid.

Product Characteristics and Qualification Tests

The following tables describe the Airflow Indicator Panel's specifications, and the qualification tests completed for this equipment.

Table 1. Product Characteristics

Part Number	62413-100
Input Power Requirements	115 VAC ± 10%, 47-440 Hz ± 10%, 50W max, externally fused at 2A
Operating Temperature Range	-28°C to +65°C
Overall Dimensions	10.16" high × 13.0" wide × 8.0" deep
Weight	18.5 lbs

Table 2. Qualification tests completed for the Airflow Indicator Panel

Test	Specification	
Vibration	MIL-STD-167-1	
Shock	MIL-S-901D	
EMI	MIL-STD-461C	
General Examination	MIL-E-16400G	
Dielectric Strength	MIL-E-16400G	
Insulation Resistance	MIL-E-16400G	
Steady-State Voltage and Frequency	MIL-E-16400G	
Transient Voltage	MIL-E-16400G	
Transient Frequency	MIL-E-16400G	
Power Interruption	MIL-E-16400G	
Power & Power Factor	MIL-E-16400G	
Spike Voltage	MIL-E-16400G	
Enclosure	MIL-STD-108E	Drip-proof, 45°
Temperature	MIL-E-16400G	Operating range, -28 to +65°C
Humidity	MIL-STD-810C	Method 507.1, Procedure IV

Description of the Airflow Indicator Panel

The Dynalec Model 62413-100 Airflow Indicator Panel monitors the airflow present in ducts, displays the absolute airflow in feet/minute on an alphanumeric display, and activates alarms if the airflow falls below a user-specified level. There are a number of user-adjustable equipment settings to tailor the unit's functionality for different operating environments.

The Airflow Indicator Panel works with these sensor types:

- Digital Resistive Thermal Device Sensor (DRTD): Dynalec Model 62413-200 (Figure 1)
- Analog Resistive Thermal Device Sensor (ARTD): All Navy-approved models
- Pinwheel Sensor (1000 ft/min) (1PIN): Dynalec Model 62413-005 (Figure 2)
- Pinwheel Sensor (5000 ft/min) (5PIN): Dynalec Model 62413-006 (Figure 2)

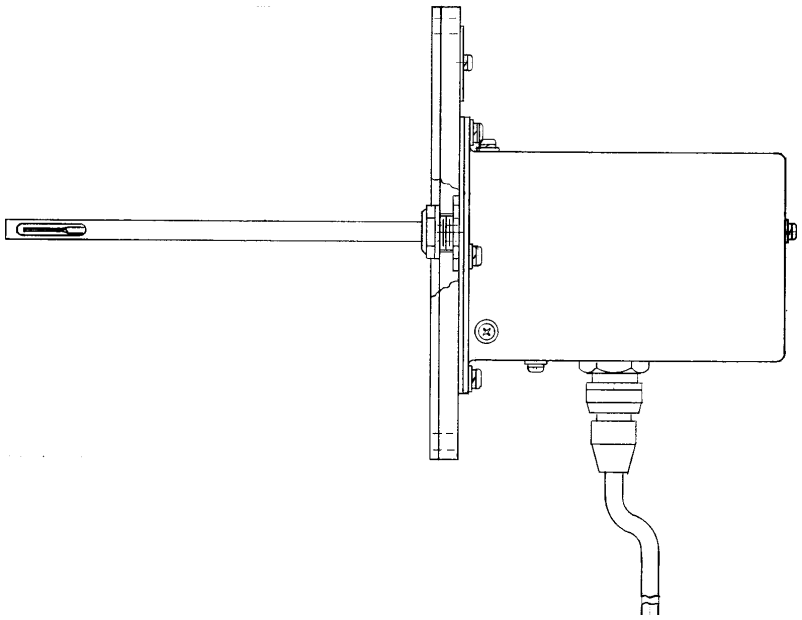


Figure 1. Dynalec digital RTD (model 62413-200)

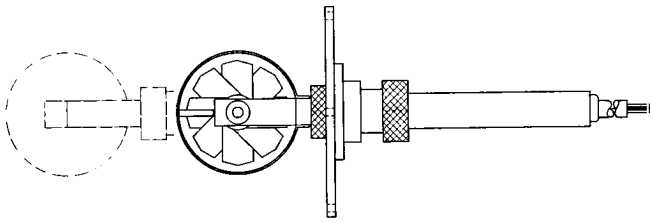


Figure 2. Dynalec pinwheel sensor (models 62413-005 and -006)

Panel features

The Airflow Indicator Panel has these main features:

- **Alphanumeric display** — Large eight-character LED display
- **Bar graph display** — Smaller nine-LED display above the alphanumeric display
- **Audible and LED alarms** — to the right of the alphanumeric and bar graph displays

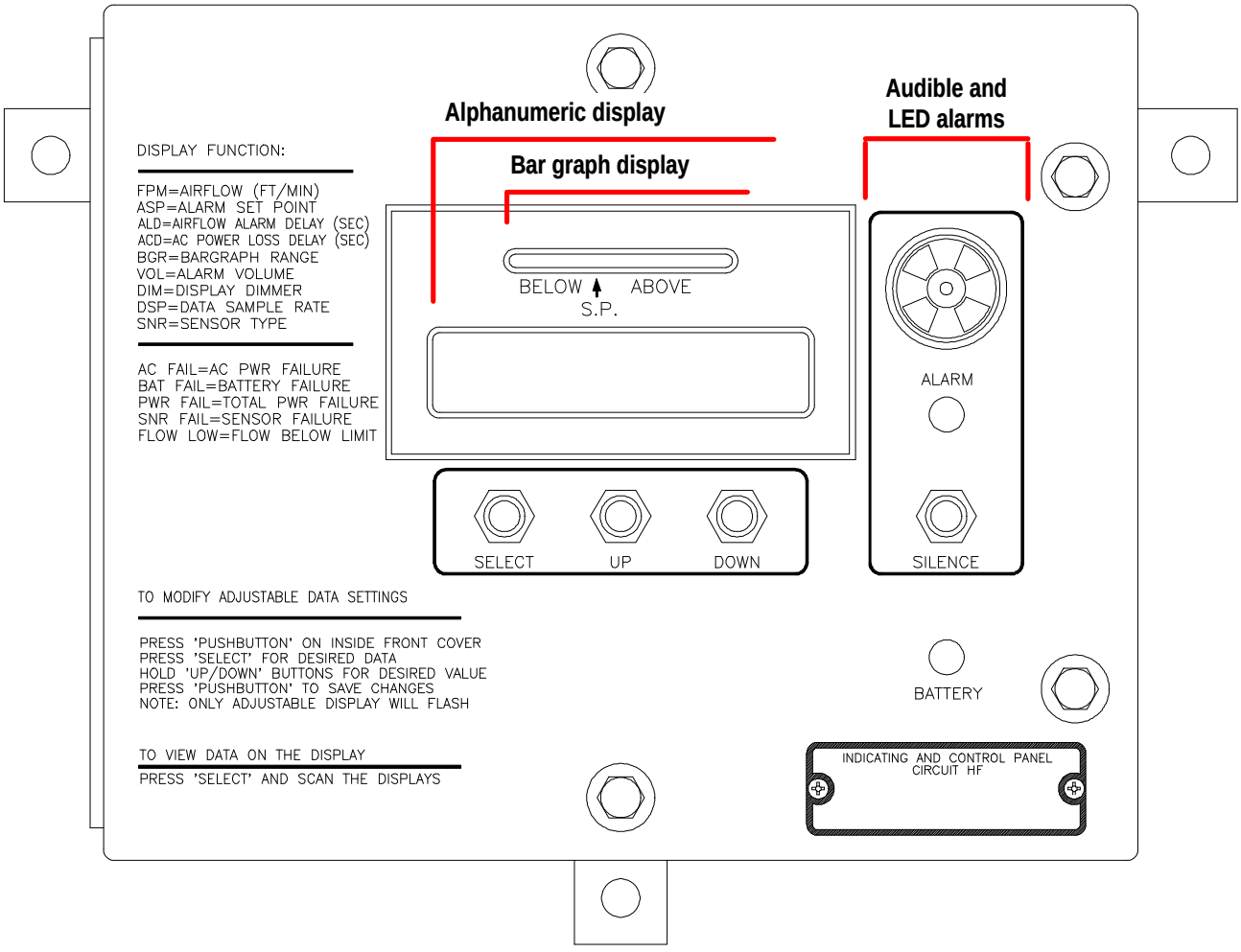


Figure 3. Features of the Airflow Indicator Panel

On the top left of the panel are a list of codes that can appear in the alphanumeric display and their meanings. These codes are described in greater detail in Table 3 on page 10. On the bottom left of the panel are instructions for viewing and changing equipment settings. These instructions are described in greater detail in the section “Changing equipment settings” on page 21.

Under the alphanumeric display are a series of buttons used to change the display.

Alphanumeric display

The alphanumeric display is a series of LEDs that normally displays absolute airflow measurements from the external sensor. The display will also show failure messages during a failure condition, and equipment settings if the **Select** button is pressed. (The **Select** button is below the alphanumeric display.)

Airflow display

The absolute airflow measurement is displayed as a three-letter code, "FPM," followed by the four-digit airflow measurement in feet per minute.

The Airflow Indicator Panel receives sensor data once every second, and averages this data over a 30-second period before updating the display. (The 30-second period is the factory default setting, which you can change). The display thus shows the average of the previous 30 seconds' worth of airflow readings, rather than the actual airflow at any given second. This keeps the airflow display from constantly flickering.

The display of the absolute airflow measurement is called "normal display mode" in this manual. This is the default display whenever the unit is turned on.

Failure message display

When there is an alarm condition, or a combination of alarm conditions, the display shows each of the failure messages in succession, for 1 second each, followed by a 1-second display of the airflow reading. These messages are displayed until the alarm conditions are removed. Alarm conditions are described in the section "Description of Alarm Conditions" on page 14.

Equipment settings display

The Airflow Indicator Panel has a number of user-adjustable settings, such as the brightness of the LED displays, sensor type, and alarm set point. You can review these setting by pressing the **Select** button. Each press of the Select button displays a different setting, until the display returns to the airflow measurement display. (If you should walk away after displaying a setting, the display automatically returns to normal display mode after five minutes.) There are eight equipment settings, plus a "setting" for testing all alarms and LEDs.

All the possible displays are listed in Table 3 following. The four-digit values shown for alarm set point (ASP) through sensor type (SNR) are the factory default settings.

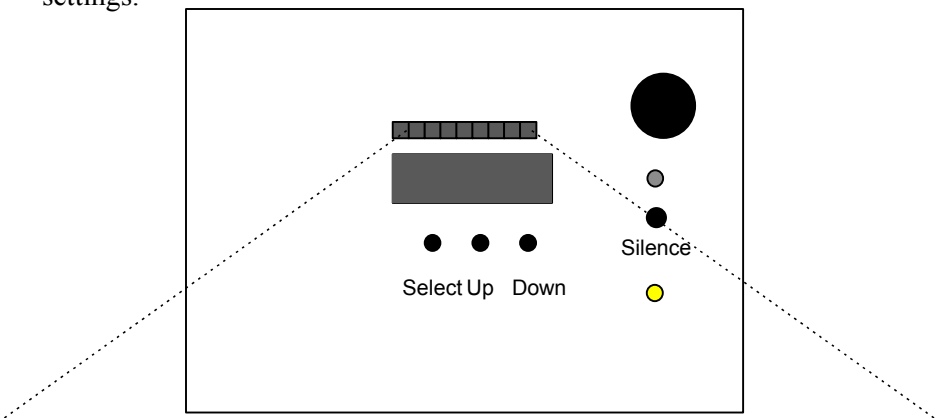
Table 3. Alphanumeric displays

Airflow reading	FPM 4500	Absolute airflow (ft/min)
Failure messages *To respond to an alarm, touch the* **Silence** *button to turn off the audible alarms. Then see the section "Responding to alarms" on page 19.*	FLOW LOW	Low airflow (airflow falls below the alarm set point)
	SNR FAIL	Sensor failure
	AC FAIL	AC power loss
	BAT FAIL	Battery power is low
	PWR FAIL	Total power failure (loss of AC and battery power; displayed when power returns to the equipment)
Equipment settings *To change any of these settings, see the section "Changing equipment settings" on page 21 .*	ASP 1000	Airflow threshold (ft/min) at which alarms are triggered (the *alarm set point*)
	ALD 0010	Number of seconds where measured airflow is below the alarm set point before alarms are triggered (the *alarm delay*)
	ACD 0010	Number of seconds without AC power before alarms are triggered (the *AC alarm delay*)
	BGR 5000	Displays the top end of the bar graph display range (ft/min)
	VOL 0007	Volume level of the audible alarm
	DIM 0007	Brightness level of the alphanumeric display, bar graph, and indicator LEDs. *This setting can be adjusted while in normal display mode.*
	DSP 0030	Period of time in which sensor data is averaged before the FPM display is updated (the *data sample period*)
	SNR DRTD	Sensor type: **DRTD** — digital RTD **ARTD** — analog RTD **1PIN** — 1000 ft/min pinwheel **5PIN** — 5000 ft/min pinwheel
	TEST IO	Pressing the Up or Down button while this setting is displayed activates all LEDs, display segments, and alarms for testing.

Bar graph display

The bar graph display is a series of nine LEDs: three red, one yellow, and five green LEDs. This display gives a quick indication of measured airflow relative to the alarm set point. (The alarm set point is a customer-specified setting of the minimum desirable airflow in feet per minute.) The single yellow LED represents the alarm set point. When this LED is lit, the measured airflow is exactly at the alarm set point. If one or more red LEDs are lit, airflow is below the alarm set point. If one or more green LEDs are lit, airflow is above the alarm set point.

The actual value in feet per minute of each LED depends on the combination of the alarm set point and the upper end of the bar graph range, two settings which you can change. As shipped from the factory, the alarm set point is set at 1000 feet per minute, and the upper end of the bar graph range is set at 5000 feet per minute. Figure 4 below shows the value of each LED at these settings.[1]



A	B	C	D	E	F	G	H	I

A	0-333 ft/min	**F**	1801-2600 ft/min
B	334-666 ft/min	**G**	2601-3400 ft/min
C	667-999 ft/min	**H**	3401-4200 ft/min
D	1000 ft/min (alarm set point)	**I**	4201-5000 ft/min
E	1001-1800 ft/min		

Figure 4. Value of LEDs at 1000 ft/min alarm set point and 5000 ft/min bar graph range

[1] To get the number of feet per minute represented by the green LEDs, subtract the alarm set point setting from the bar graph range setting and divide the result by 5 (since there are five green LEDs). To get the number of feet per minute represented by the red LEDs, divide the alarm set point by 3 (since there are three red LEDs). Using the example of the factory-installed settings given above:

(5000 ft/min - 1000 ft/min) / 5 green LEDs = 800 ft/min per green LED
1000 ft/min / 3 red LEDs = 333 ft/min per red LED

Audible and LED alarms

An audible alarm at the upper right of the front panel emits a loud tone during most alarm conditions (alarm conditions are described in the section "Description of Alarm Conditions" below). To turn off this alarm, press the **Silence** button (Figure).The tone's volume can be changed (see the section "Changing equipment settings" on page 21).

Directly below the audible alarm speaker are two LEDs, the alarm LED and the battery LED. The alarm LED is lit during an alarm condition (see the section "Description of Alarm Conditions"). It remains lit until alarm conditions are removed. (It does not turn off when you press the **Silence** button.) The battery LED blinks periodically while the equipment is running on AC power, to show the system is periodically checking the battery. When the LED is lit, rather than blinking, it means the system is operating on internal battery power.

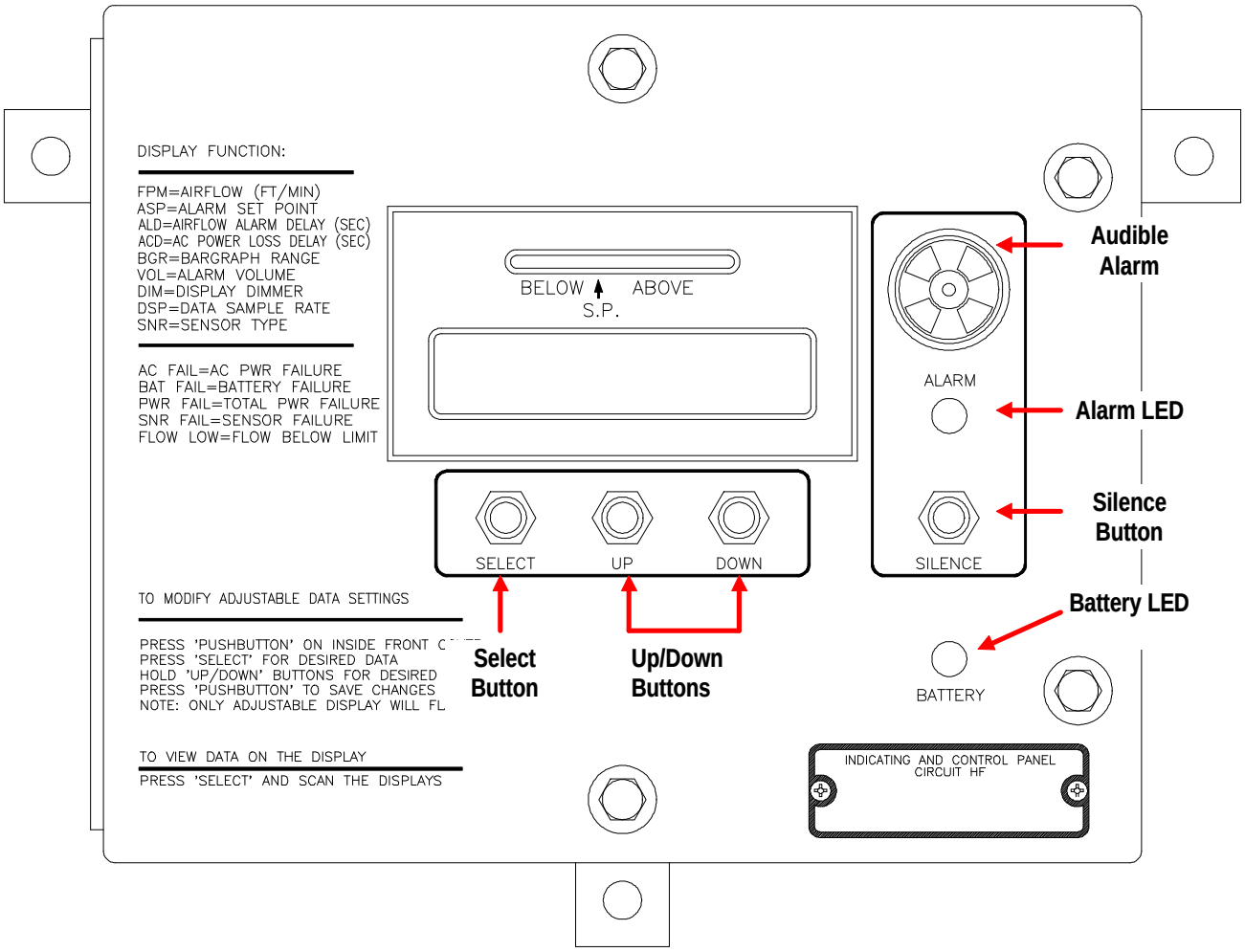


Figure 5. Other features of the Airflow Indicator Panel

Front panel buttons

Select button

Press this button to display the user-adjustable equipment settings in the alphanumeric display. Equipment settings are described in Table 6 on page 25.

Up/Down buttons

These buttons change an equipment setting when it is displayed in the alphanumeric display *in user data entry mode* (defined on page 21). For example, if you press the **Select** button until the alarm volume setting is displayed, you can then press the **Up** or **Down** button to change the setting of the alarm volume. The options for each setting are described in Table 6 on page 25.

Silence button

Press this button to silence all audible alarms during an alarm condition.

Pressing the **Silence** button has no effect if there is no alarm condition.

Description of Alarm Conditions

The Airflow Indicator Panel constantly monitors a variety of conditions which indicate proper system operation. When the unit detects an alarm condition, a failure message is generated and the appropriate alarm output signals are activated. The alarm conditions are:

- Low airflow detected
- Sensor failure
- AC power failure
- Battery failure
- Total power failure

The signals output by each of these conditions are described on page 16.

Low airflow detected

If detected airflow is less than the alarm set point for a longer time than the specified alarm delay period, a low airflow alarm condition is generated. The alphanumeric display then switches between displaying the measured airflow and the **FLOW LOW** failure message (and any other failure messages that are present) at 1-second intervals. On the front panel, the audible alarm and the alarm indicator LED are activated. The external alarm, the AC alarm, and the tri-state alarms are also activated.

Sensor failure

Each of the sensors which can operate with the Airflow Indicator Panel have different failure modes:

- **Digital RTD** — This sensor periodically sends a digital message to the Airflow Indicator Panel which contains the airflow measurement. A sensor failure is present if the Airflow Indicator Panel stops receiving data from the digital sensor.
- **Analog RTD** — This sensor constantly outputs an analog current which corresponds to the measured airflow. This current typically falls between 250mA and 500mA for airflow measurements between 0 and 5000 ft/min. A sensor failure is present if the output current of the sensor falls below 235mA or exceeds 515mA.
- **Pinwheel sensor** (1000 ft/min or 5000 ft/min) — This sensor operates using a spinning pinwheel which, in turn, generates a switch closure with a frequency corresponding to the airflow. Dirt lodged in the pinwheel can prevent it from spinning. A sensor failure is present if the pinwheel ceases to spin.

If the appropriate failure condition for the sensor type being used is present, the alphanumeric display stops displaying the measured airflow, and displays the **SNR FAIL** message, alternating with any other existing failure messages present, at 1-second intervals. On the front panel, the audible alarm and the alarm indicator LED are activated. The external alarm, the AC alarm, and the tri-state alarms are also activated.

AC power failure

If the Airflow Indicator Panel loses AC power for longer than the specified AC alarm delay period, an AC power failure alarm condition is generated. The alphanumeric display then switches between displaying the measured airflow and the **AC FAIL** failure message (and any other failure messages that are present) at 1-second intervals. On the front panel, the audible alarm and the alarm indicator LED are activated. In addition, the external alarm is activated.

Battery failure

The Airflow Indicator Panel periodically checks the voltage of the internal battery to determine its capacity to support the system. If the battery voltage drops below 9.5 volts, a battery failure alarm condition is generated. The alphanumeric display then switches between displaying the measured airflow and the **BAT FAIL** failure message (and any other failure messages that are present) at 1-second intervals. On the front panel, the audible alarm and the alarm indicator LED are activated. In addition, the external alarm and the AC alarm are activated.

Total power failure

A fully charged battery can support the system for a minimum of 30 minutes after the loss of AC power. A total power failure condition is present if the battery voltage has dropped below 9.5 volts and there is still no AC input power. If this occurs, the tri-state alarm is activated to indicate a “fault” condition. When power is restored to the system, the **PWR FAIL** failure message appears, and the alarm indicator LED is activated, showing that all available power to the system was lost. This message is alternately displayed with the measured airflow (and any other failure messages that are present).

Description of Output Signals

The Airflow Indicator Panel can generate several output signals:

- External alarm
- AC alarm
- Tri-state alarm
- Analog output signal

External alarm

+11 VDC ± 20% is presented across terminals TB1-3 to TB1-4 (TB1-3 is positive terminal). This output is intended to drive an external audible alarm (100 mA max).

AC alarm

This 115 VRMS ± 10%, 47 - 440 Hz AC output signal is presented across terminals TB1-6 to TB1-9. This output is intended to drive an external bell and is fused (via F1 and F2) at 2A.

Tri-state alarm

During normal operation: A resistance of 6.8 KΩ ± 10% is presented across both Normally Open and Normally Closed contacts. These outputs are compatible with MIL-A-17196, Type IC/SM alarm panels.

For alarm conditions listed in Table 4: A resistance of less than 1Ω is presented across terminals TB2-8 and TB2-10 (Normally Open contacts) and a resistance of greater than 100 KΩ is presented across terminals TB2-8 and TB2-9 (Normally Closed contacts).

In a fault condition where total power is lost: A resistance of greater than 100 KΩ is presented across terminals TB2-8 and TB2-10 (Normally Open contacts) and a resistance of less than 1Ω is presented across terminals TB2-8 and TB2-9 (Normally Closed contacts).

Table 4. Alarms generated for each alarm condition

	Alphanumeric display	Front panel audible alarm	Alarm LED	External alarm	AC alarm (external bell)[1]	Tri-state alarm
Low airflow detected	**FLOW LOW**	✓	✓	✓	✓	✓
Sensor failure	**SNR FAIL**[2]	✓	✓	✓	✓	✓
AC power failure	**AC FAIL**[3]	✓	✓	✓		
Battery failure	**BAT FAIL**	✓	✓	✓	✓	
Total power failure	**PWR FAIL**[4]					✓(fault)

Analog output signal

The Airflow Indicator Panel also provides an analog output signal which is proportional to the measured airflow. The analog signal depends on the type of sensor being used:

- **For a digital RTD sensor, analog RTD sensor, or 5000 ft/min pinwheel sensor**: The analog output signal varies linearly from 0 to 10 VDC for airflow measurements of 0 to 5000 ft/min, respectively.
- **For a 1000 ft/min pinwheel sensor**: The analog output signal varies linearly from 0 to 10 VDC for airflow measurements of 0 to 1000 ft/min. This analog output signal is present on terminals TB1-1 and TB1-2 (TB1-1 is the positive reference terminal).

Function of the Silence button

Alarm indications remain until either 1) the alarm conditions are removed or 2) the **SILENCE** button on the front panel is depressed, silencing all audible alarms.

The Silence button silences:

- Front panel alarm
- External alarm
- AC alarm

Pressing the **Silence** button has no effect on the panel LEDs and the tri-state alarm signal.

---

1 The alarm is generated only while the system is on AC power, not on battery power.

2 Digital RTD - no data being received
Analog RTD - less than 235 ma or more than 515 ma
1000 or 5000 pinwheel - stops spinning

3 This message can be displayed if the battery is functional; if not, the system will instead report a total power failure once power is restored

4 This message is displayed after power is returned to the unit.

Operation

This section explains how to:

- Respond to an alarm
- Change the brightness of the panel's LEDs
- Change the equipment settings.

Responding to an Alarm

During an alarm condition, the alphanumeric display flashes the airflow reading and one or more failure messages for 1 second each.

1. Press the **Silence** button to turn off the front panel's audible alarm and any external bell or audible alarm. (Except for the **PWR FAIL** message, alarm messages are displayed until the alarm conditions are removed.)
2. Look at the alphanumeric display for a description of the failure(s).
3. Use Table 5 below to resolve problems and remove the failure messages from the display.

   For troubleshooting other problems, see Table 8 in the Corrective Maintenance chapter (page 37).

Table 5. What the error messages mean

Alphanumeric display reads:	Means:	Action to take:
FLOW LOW	Airflow has fallen below the Alarm Set Point	Increase the airflow through the duct
SNR FAIL	Depends on the sensor type: **DRTD** – No data is being received **ARTD** – ma is less than 250 or greater than 500 **1000 ft/min pinwheel** – no longer spinning **5000 ft/min pinwheel** – no longer spinning	Check the sensor; check connections
AC FAIL	AC power has been lost	Check the power source; open the Airflow Indicator's front panel and check the terminal board connection to AC power
BAT FAIL	Battery output is reduced to 9.5V	Battery is reaching the limit of its capability to support the system. Restore AC power. If AC power is present and the battery is not charging, you may need to replace the battery.
PWR FAIL	AC power has been lost, and the battery has also failed	Press the **Silence** button to remove the message. Check the power source; open the Airflow Indicator's front panel and check the terminal board connection to AC power

Changing Equipment Settings

The Airflow Indicator Panel has two modes of operation, *normal display mode* and *user data entry mode*.

Normal display mode

In *normal display mode*, the alphanumeric display shows the absolute airflow reading and any failure messages. If you press the **Select** button repeatedly, the display cycles through the list of equipment settings, and back to the airflow reading.

While in normal display mode, the only equipment setting you can change is the brightness of the alphanumeric and LED displays. If you press **Select** until the alphanumeric display shows the **DIM** code, the display begins flashing, meaning that you can change this setting using the **Up** and **Down** buttons.

User data entry mode

You can change all equipment settings in *user data entry mode.* This simply makes the display of equipment settings flash on and off, and activates the **Up** and **Down** buttons. To enter user data entry mode, press a switch behind the front panel called the **Mode** switch.

When you press the **Mode** switch, the absolute airflow reading on the front panel, and any failure messages, are displayed with an underscore (_) after the three-character code. If you then press the **Select** button to scroll through the equipment settings, the display flashes on and off (½ second on; ½ second off).

If you press the **Mode** switch again, the underscore disappears, or the equipment settings stop flashing, and you have returned to normal display mode. (If you should walk away while the equipment is in user data entry mode, the system will automatically return to normal display mode within five minutes after the last button press.)

How to make changes in user data entry mode

To change a setting, you press the **Select** button repeatedly until you see its three-letter code in the alphanumeric display. You then press the **Up** or **Down** button to adjust the setting.

Some settings have wide ranges of values to select from. For example, the alarm set point (**ASP**) can be set to a value between 10 and 5000 ft/min. For these settings, you can rapidly scroll through the range by holding down the **Up** or **Down** button rather than just pressing it repeatedly.

The setting display wraps around to the low end of the range after reaching the high end of the range. For example, if the alarm set point is set at its maximum setting, 5000 ft/min, and you touch the **Up** button, the setting display returns to 10 ft/min. Table 6 on page 25 lists the ranges and default values for each setting.

Any changes you make while in user data entry mode are saved to memory (that is, the settings are saved even if the unit loses power or is turned off). These settings remain until changed again.

Changing equipment settings

1 Put the unit in user data entry mode:

- Open the front panel.
- Locate the **Mode** switch at the bottom of the board mounted behind the front panel
- Press the **Mode** switch.
- Push the front panel closed without securing it, so you can see the alphanumeric display. There should now be an underscore after the three-character code.

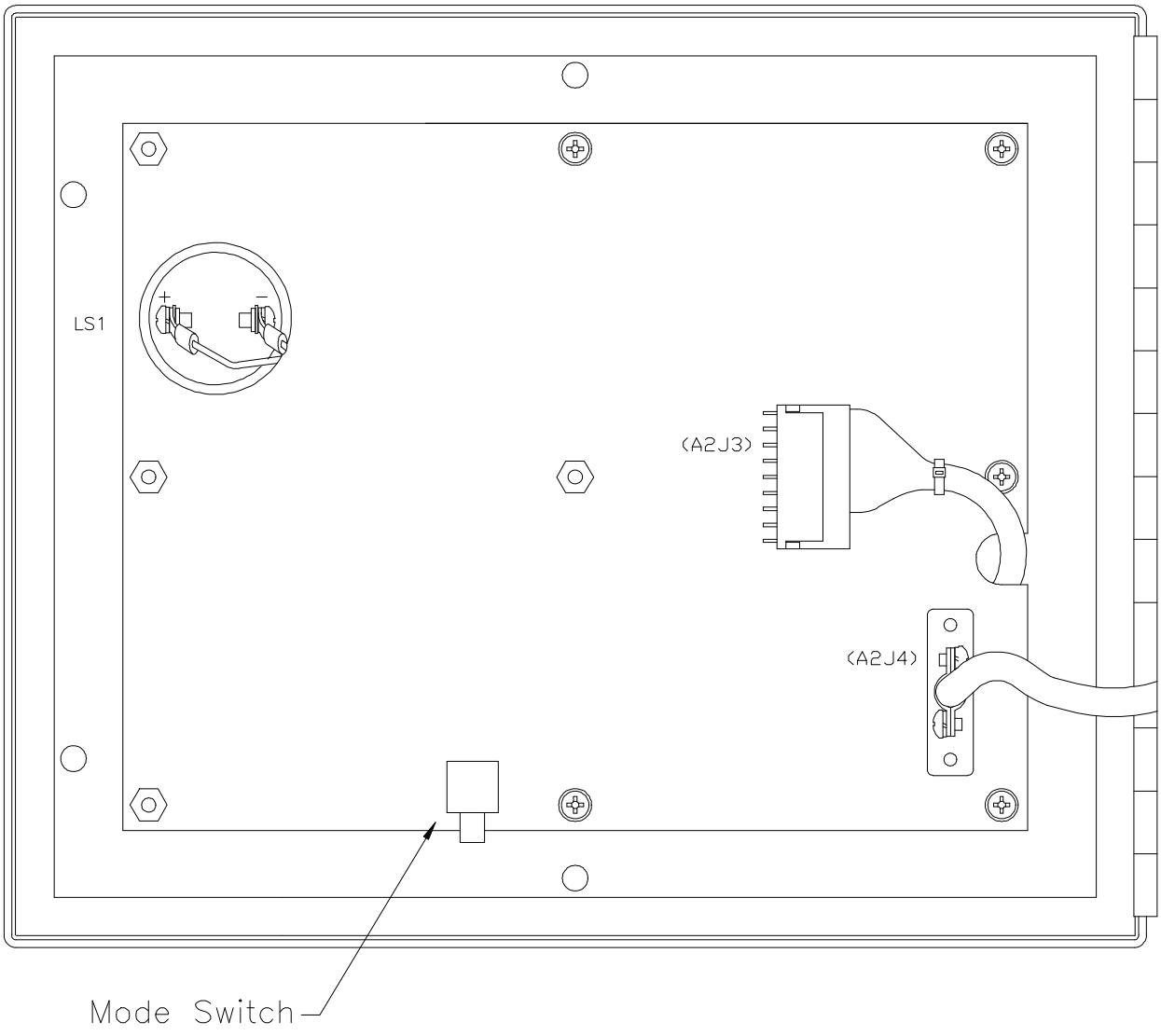


Figure 6. Mode switch behind the front panel

2 Press the **Select** button until the display shows the equipment setting you want to change:

Number of presses	Display	Setting
1	**ASP**	Alarm set point
2	**ALD**	Alarm delay
3	**ACD**	AC alarm delay
4	**BGR**	Upper end of bar graph range
5	**VOL**	Audible alarm volume
6	**DIM**	Display brightness
7	**DSP**	Data sample period
8	**SNR**	Sensor type
9	**TEST IO**	—
10	**FPM**	—
11, 12, etc.	**ASP, ALD...**	(Repeats equipment settings)

3 Press the **Up** or **Down** button to change the setting. Use Table 6 on page 25 as a guide.

- Press the button in discrete presses to change the setting by a step at a time.
- Or, hold the button down longer than 4 seconds to scroll rapidly through the range of choices.

Note: *Your changes take effect as soon as you release the Up or Down button. You do not have to press* ***Select*** *to "enter" the change, or return to display mode.*

4 Return the system to display mode:

- Open the front panel.
- Press the **Mode** switch. The alphanumeric display should return to displaying airflow and any failure messages.

5 Resecure the front panel.

Note: *The system automatically returns to normal display mode 5 minutes after the last button press if it is not manually returned to normal display mode.*

Table 6. Equipment settings

Display	Definition	Default value	Range	Up/Down button press	Notes
FPM	Measured airflow in feet per minute	—	0-5000 ft/min	—	(For display only)
ASP	Alarm set point	1000 ft/min	10-5000 ft/min	± 10 ft/min	Minimum desirable airflow. Represented by the yellow LED in the bar graph display. This setting works in conjunction with the alarm delay (see the following table entry) setting to determine when a **FLOW LOW** alarm condition is present.
ALD	Alarm delay	10 sec	1-300 sec	± 1 sec	Length of time that measured airflow is below the alarm set point before a **FLOW LOW** alarm condition is generated and alarms are triggered. This delay prevents temporary fluctuations in airflow from activating the alarms.
ACD	AC alarm delay	10 sec	1-300 sec	± 1 sec	Length of time that power is lost before an **AC FAIL** alarm condition is generated and alarms are triggered. This delay prevents temporary power losses from activating the alarms.
BGR	Bar graph display range	5000 ft/min	ASP - 5000 ft/min	± 10 ft/min	Upper end of the bar graph display range. This setting, and the alarm set point (see the first table entry), together determine the relative value of the green LEDs in the bar graph display. For example, with an alarm set point of 1000 ft/min, and an upper end set at 5000 ft/min, each green LED represents 800 ft/min of airflow above the alarm set point. (For an explanation of how this is calculated, see the section “Bar graph display” on page 11.)
VOL	Audible alarm volume	7 (loud)	0 (quiet)-7 (loud)	± 1	
DIM	Display brightness	7 (bright)	0 (dim)-7 (bright)	± 1	
DSP	Data sample period	30	1-60	± 1	The time period for which airflow readings will be averaged before updating the display. This prevents the display from flickering.

Display	Definition	Default value	Range	Up/Down button press	Notes
SNR	Sensor type	DRTD	DRTD, ARTD, 1PIN, 5PIN	DRTD, ARTD, 1PIN, 5PIN	DRTD - digital RTD ARTD - analog RTD 1 pin - 1000 ft/min pinwheel 5 pin - 5000 ft/min pinwheel
TEST IO	Simultaneous test of all LEDs and audible alarms, including external	—	—	See Notes.	Press the **Up** or **Down** button to begin the test. Release the button to end the test. If the system is connected to an external, main alarm board, we recommend informing personnel at that board before performing this test.

Testing the LED Displays/Alarm Outputs

The Airflow Indicator Panel provides a way to test all LED displays and alarm output signals simultaneously.

1. In either normal display mode or user data entry mode, press the **Select** button on the front panel several times until the **TEST IO** code appears on the alphanumeric display.
2. Press and hold either the **Up** or **Down** button. All LEDs, including the alphanumeric display segments, bar graph LEDs, and alarm and battery LEDs will be illuminated. In addition, all alarm outputs including the front panel audible alarm, external alarm, AC alarm, and tri-state alarm will be activated.
3. Release the **Up** or **Down** button to stop the test.
4. Press **Select** until the **FPM** code and current airflow measurement are displayed. (This display returns automatically if **TEST IO** is displayed more than 5 minutes.)

Note: *If the* **TEST IO** *function is activated during an alarm condition that has been silenced using the* **Silence** *button, the audible alarms will have to be silenced again after the* **TEST IO** *function is completed.*

Functional Description

The Airflow Indicator Panel (Model 62413-100) is a microprocessor-based system designed to combine user-friendliness and flexibility with accurate airflow sensing in ductwork. The system can be adjusted by the user to optimize its performance in specific environments.

This section describes the Airflow Indicator Panel's:

- Three internal PC boards
- Input and output functions, including power supply, sensor input signals, outputs to displays, and alarm outputs and signal.

Following is a functional block diagram for the Airflow Indicator Panel and its associated interfacing equipment.

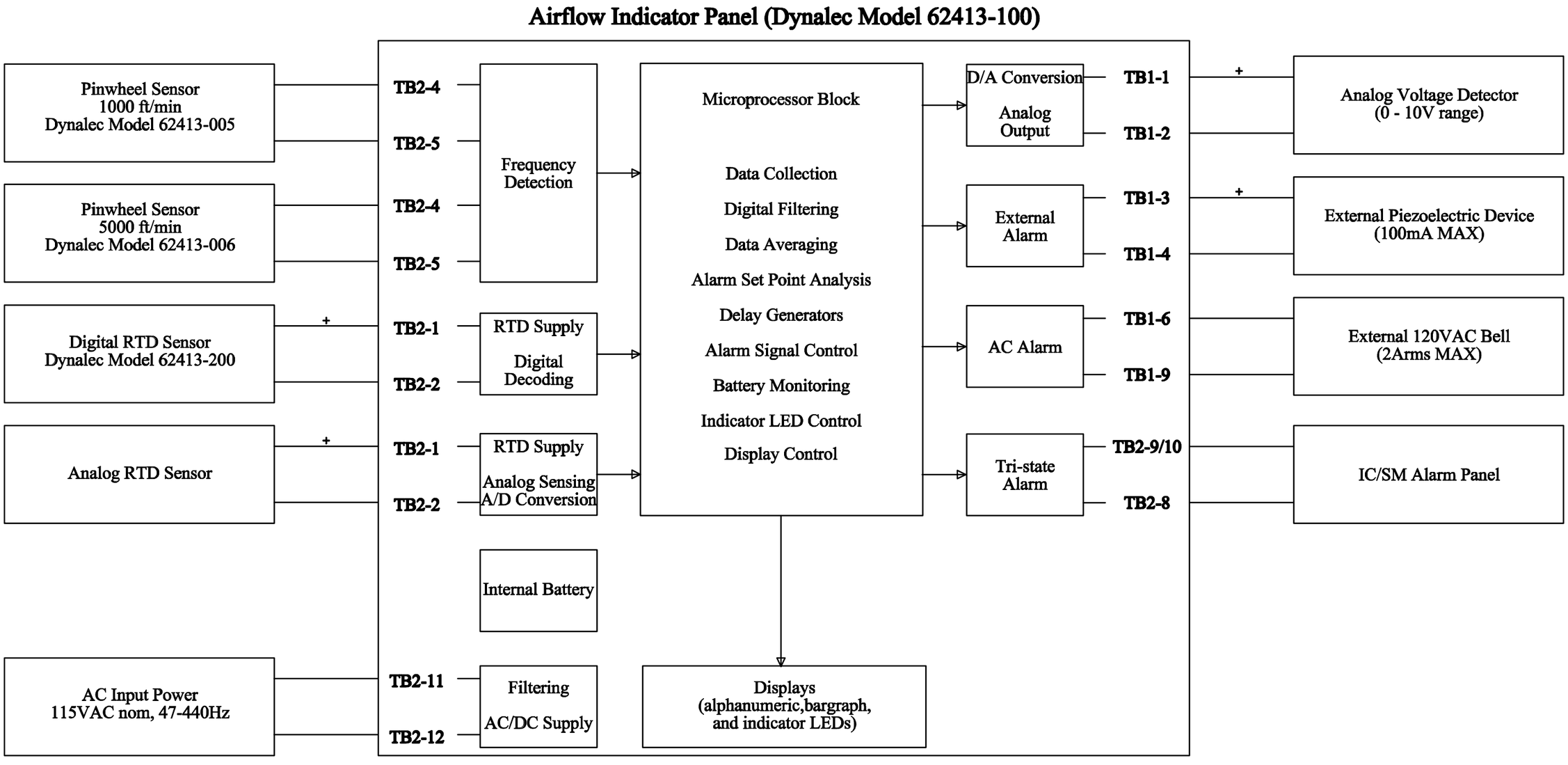


Figure 7. Functional block diagram of the Airflow Indicator Panel

PC Boards

The Airflow Indicator Panel consists of three PC boards. Their main functions include:

- **Power Management Board** (Dynalec part # 62413-145): Battery charging, main DC regulation, supply/battery relays, and pinwheel input signal buffering.
- **Display Board** (Dynalec part # 62413-120): Alphanumeric display control and driving, bar graph display control and driving, and alarm indicator LED control and driving.
- **Processor Board** (Dynalec part # 62413-140): All other functions described in the functional block diagram are performed by the processor board. The **Mode** switch is also located on this PC board.

PCB potentiometers

There are three potentiometers on the PC boards in the Airflow Indicator Panel: two on the Processor Board, and one on the Power Management Board.

Caution

These pots are factory adjusted and locked in position. No further adjustment is required.

Incorrect adjustment of these pots may lead to inaccurate operation of the Airflow Indicator Panel.

Inputs

Power supply

The Airflow Indicator Panel incorporates a switching AC/DC power supply for controlled, efficient operation when AC power is being supplied to the unit. The AC line is filtered to reduce EMI (see Table 2, Qualification tests completed for the Airflow Indicator Panel, on page 6). Additional filtration and regulation of the power supply, as well as the battery charging circuitry, are present on the Power Management Board (62413-145).

Since the presence of main AC input power to the unit is constantly monitored by the system's microprocessor, the system automatically switches to internal battery power if input power is lost. The system can operate off a fully charged battery for a minimum of 30 minutes. The recharge time for a fully discharged battery (to full charge) is approximately 20 hours.

Sensor

As described in the Operation chapter, the Airflow Indicator Panel can work with four sensor models:

The **digital RTD sensor** (Dynalec # 62413-200) receives its power from the Airflow Indicator Panel and transfers airflow data to the system digitally. By transferring data in this fashion, the airflow data is not subject to varying line conditions and is less susceptible to noise. The Airflow Indicator Panel, in turn, decodes the data and performs any filtering or averaging necessary before to sending the information to the display.

The **analog RTD sensor** also receives its power from the Airflow Indicator Panel, but the airflow data is transferred in the form of analog current variations. These variations are sensed by the Airflow Indicator Panel and then digitized and processed like the Digital RTD sensor data.

The **pinwheel sensors** (Dynalec #'s 62413-005 and -006) are passive devices. They provide switch closures which occur at a frequency corresponding to the measured airflow. This frequency is detected by the Airflow Indicator Panel and processed like the RTD sensor data.

Outputs

Displays

The Airflow Indicator Panel uses several types of displays:

The **8-digit alphanumeric display** consists of 14-segment LED displays. The control and drive of these displays are included on the Display Board (Dynalec # 62413-120).

The **bar graph display** consists of nine discrete LEDs. The control and drive of these displays are also included on the Display Board.

The Airflow Indicator Panel's **TEST IO** feature is an easy way to test all LEDs in the system, including those in the alphanumeric displays, the bar graph display, and the alarm and battery indicators.

Alarms

The system microprocessor controls all alarm outputs, including:

- Front panel alarm LED
- Front panel audible alarm
- External alarm
- AC alarm signal
- Tri-state alarm.

The control of all alarm outputs is included on the Airflow Indicator Panel's Processor Board (see Table 7 for detailed description of the alarm signals). The main switching device for the AC alarm output is the solid-state relay (K3). The main switching devices for the tri-state alarm output are relays K1 and K2.

Analog signal

The Airflow Indicator Panel provides a 0-10V output proportional to the measured airflow. Depending on the sensor that is providing the measurement, the microprocessor sends data to the D/A converter (on the Processor Board [62413-140]) for conversion.

For all sensors other than the 1000 ft/min pinwheel, the D/A converter outputs 0Vdc for a 0 ft/min airflow and 10Vdc for a 5000 ft/min airflow. For the 1000 ft/min sensor, the converter outputs 0Vdc for a 0 ft/min airflow and 10Vdc for a 1000 ft/min airflow.

Table 7. Inputs and outputs of the Airflow Indicator Panel

Signal	Connection	Description
AC input power	TB2-11 to TB2-12	115 VAC ± 10%, 47 to 440 Hz ± 10% This input should be fused at 2A externally.
RTD sensor input	TB2-1(+) to TB2-2	This connection provides power to both types of RTD sensors while also providing the path for airflow data output from the sensor.
Pinwheel sensor input	TB2-4 to TB2-5	This connection provides airflow data from a pinwheel type sensor to the alphanumeric display.
Analog output	TB1-1(+) to TB1-2	This connection provides an analog voltage between 0 and 10 VDC proportional to the measured airflow (where 0V = 0 ft/min and 10V = 1000 ft/min for the 1000 ft/min pinwheel sensor and 5000 ft/min for all other sensors). The maximum load this output is capable of driving is 3.5mA.
External alarm output	TB1-3(+) to TB1-4	This connection provides a voltage of 11 VDC ± 20% during the alarm conditions specified in Table 4 on page 17. The output is in a high-impedance state for non-alarm conditions. The maximum load this output is capable of driving is 100mA.
AC alarm output	TB1-6 to TB1-9	This connection provides a voltage of 115 VAC ± 10%, 47 - 440 Hz ± 10% (derived from input AC power) during the alarm conditions specified in Table 4 on page 17. The output is in a high-impedance state for non-alarm conditions. The maximum load this output is capable of driving is 1.5 Arms.
Tri-state alarm output	TB2-9 to TB2-8 (NC) TB2-10 to TB2-8 (NO)	These connections provide isolated contact closures, opens, or fixed resistances during the alarm conditions specified in Table 4 on page 17. During normal operation, both NC and NO outputs present a fixed 6.8 KΩ impedance. During alarm conditions, a resistance of less than 1Ω is presented across the NO contacts and a resistance greater than 100K is presented across the NC contacts. During fault conditions (Table 4), a resistance of greater than 100K is presented across the NO contacts and a resistance of less than 1Ω is presented across the NC contacts.

Corrective Maintenance

This chapter contains:

- A table listing problems you may encounter and suggested solutions
- A schematic diagram of the Airflow Indicator Panel.

The Airflow Indicator Panel has been designed to minimize the troubleshooting and repair processes. Use the schematic in Figure 8 and Table 8 below as a guide if problems occur.

Table 8. Troubleshooting guide

Symptom	Suggested Solution
Unit fails to operate	AC power is not connected and the battery is dead. Using a meter, confirm that 115VAC power is present at TB2–11 and –12. If not, confirm input power wiring. Confirm that the power switch S1 is in the ON position and check for 115VAC power the input terminals of the power supply, PS1 (across AC and ACC input terminals). If power is present here and the Power Available indicator (DS1) is not illuminated, replace DS1. If 115VAC is not present, confirm that 115VAC is present at the input of FL1 and the output of FL2. If power is present at the input of one of the filters and not the output, replace the appropriate filter. Confirm that 115VAC is present across the 2C and 3C contacts (input) of S1. Confirm that 115VAC is present across the 2NC and 3NC contacts (output) of S1 (with S1 in the ON position). If power is present at the input and not the output, replace S1. If 115VAC power is present at the input to the power supply (PS1), using a meter, confirm that approximately +13VDC is present at the supply's output terminals (across DC OUTPUT + and – terminals). If DC output from the supply is not present, disconnect W3P1 from A1J1 to eliminate load on the supply. If DC output is still not present, replace PS1. If DC supply output returns when its load is disconnected, disconnect W2P2 from A1J2 to isolate the remainder of the system load. Reconnect W3P1 to A1J1 and check the output of the supply for approximately +13VDC. If the DC output is still not present, replace A1 – Power Management PCB Assembly (Dynalec P/N 62413-145). If DC output power is present with W3P1 reconnected, disconnect

	A2 – Processor Board PCB Assembly from A3 – Display Board PCB Assembly. Reconnect W2P2 to A1J2 and check the output of the supply for approximately +13VDC. If the DC output is still not present, replace A2 – Processor Board PCB Assembly (Dynalec P/N 62413-140). If the DC output is present, replace A3 – Display Board PCB Assembly (Dynalec P/N 62413-120). If 115VAC input power is not available to the unit, using a meter, confirm that +10-13VDC is present across the terminals of the battery, BT1. If not, the battery may require recharging. See the "Battery Not Charging" section below for more information. If +10-13VDC is present at the terminals of the battery, confirm that, with the – meter lead still on the – terminal of the battery, the same voltage is read with the + meter lead on the 1C terminal (input terminal) of S1 with S1 in the ON position. If not, check the wiring between the battery (BT1) and the power switch (S1). Confirm that the same voltage is read with the + meter lead on the 1NC terminal (output terminal) of S1. If the voltage is present at the input and not the output, replace S1. Confirm that the +10-13VDC battery voltage is present across terminals 1 and 13 of A1J1. If not, check the wiring between the battery BT1, the power switch S1, and W3P1 (mates to A1J1). If the +10-13VDC battery voltage is present across the appropriate terminals of A1J1, confirm that a voltage between +4.9 and +5.1VDC is present across A1C3. If this voltage is not present, disconnect W2P2 from A1J2 and again check for the appropriate voltage across A1C3. If this voltage is still not present, replace A1 – Power Management PCB Assembly (Dynalec P/N 62413-145). If the +4.9V-+5.1VDC is present after disconnecting W2P2, disconnect A2 – Processor Board PCB Assembly from A3 – Display Board PCB Assembly. Reconnect W2P2 to A1J2 and check the voltage across A1C3 again. If the appropriate voltage is still not present, replace A2 – Processor Board PCB Assembly (Dynalec P/N 62413-140). If the appropriate voltage is present, replace A3 – Display Board PCB Assembly (Dynalec P/N 62413-120).
TEST IO yields unlit LED	Replace the Display Board (62413-120).
TEST IO yields non-functional alarm	If the non-functional alarm is the External Alarm: Confirm that a 62413-240 Remote Audible Alarm unit is connected to TB1 terminals 3 and 4. Confirm that the correct polarity is maintained in the connection between the panel and the Remote Audible Alarm unit. If a howler-based Remote Audible Alarm unit is connected to the unit, damage could result (and may be visible) to A2U8. Connect the + lead of a DC meter to the + terminal of A2C12. Connect the – lead of the meter to pin 3 of A2U8. Confirm that a voltage of approximately +13VDC is obtained while TEST IO is active. If not, replace A2 – Processor Board PCB Assembly

	(Dynalec P/N 62413-140). If this voltage is present, connect the + lead of the meter to pin 17 of A1J1. Connect the – lead of the meter to one of the terminals of A1RT3. Confirm that a voltage of approximately +13VDC is obtained with the – meter lead on either side of A1RT3 while TEST IO is active. If the voltage is present on neither side, confirm the connection of the EXT ALARM – 115VAC line in the W2 cable assembly between A1 and A2. Replace this cable if necessary. If the voltage is present on one side of A1RT3 but not the other, temporarily disconnect the Remote Audible Alarm unit from TB1 and take the measurement again. If the voltage is still present on only one side of A1RT3, replace A1 – Power Management PCB Assembly (Dynalec P/N 62413-145). If the voltage is present on both sides of A1RT3, confirm the connections between W3P1 and TB1 terminals 3 and 4. If the non-functional alarm is the AC Alarm: Check fuses F1 and F2 for a "blown" indication (fuse-holder will be illuminated ONLY if the AC Alarm is active). Replace fuses if necessary. If fuses are not blown, follow the instructions above for the External Alarm tracing the control signal (common to both the External Alarm and the AC Alarm) through A1RT3. If the voltage is present on both sides of A1RT3, connect the + lead of the meter to terminal 3 of K3 and the – lead of the meter to terminal 4 of K3. Confirm that a voltage of approximately +5VDC is obtained while TEST IO is active. If this voltage is not present, confirm the connections between W3P1 and K3. If the voltage is present, replace K3. If the non-functional alarm is the Tri-State Alarm: Connect the + lead of a DC meter to the + terminal of A2C12. Connect the – lead of the meter to pin 5 of A2U8. Confirm that a voltage of approximately +13VDC is obtained while TEST IO is active. If not, replace A2 – Processor Board PCB Assembly (Dynalec P/N 62413-140). If this voltage is present, connect the + lead of the meter to pin 17 of A1J1. Connect the – lead of the meter to the middle leg of A1Q1. Confirm that a voltage of approximately +13VDC is obtained while TEST IO is active. If the voltage is not present, confirm the connection of the TRI-STATE ALARM – RELAY CONTROL OUT line in the W2 cable assembly between A1 and A2. Replace this cable if necessary. If the voltage is present, move the – meter lead to pin 11 of A1J1. Confirm that a voltage of approximately +13VDC is obtained while TEST IO is active. If not, replace A1 – Power Management PCB Assembly (Dynalec P/N 62413-145). If the voltage is present, confirm the connections between W3P1 pin 11 and K2 pin 7. Also confirm the connections between K1, K2, and CR2. If these connections are acceptable, replace K2.

Select, **Up/Down**, or **Silence** buttons not functioning	Check the wiring to each of the push-button switches to W1P3 (see System Schematic). Connect the – lead of a DC meter to the – terminal of A2C12. Connect the + meter lead to terminal 1 of A2J3. Confirm that, when the UP button is not pressed, the meter reading is approximately +5VDC. When the button is pressed, the meter reading is approximately 0VDC. Repeat the above procedure for the DOWN, SILENCE, and SELECT buttons placing the + meter lead on terminals 2, 3, and 6 of A2J3, respectively. Replace the push-button switch(es) if necessary.
Battery not charging	Allow a few hours with 115VAC connected to the unit for the battery to recharge. If several hours have passed with 115VAC present and the DC voltage across the battery is still not +10-13VDC, remove the connection from the + terminal of the battery and insert a DC ammeter. Confirm that charging current is flowing into the battery. If no current is flowing into the battery, confirm the connections between BT1 and W3P1 through S1 (see System Schematic). If connections are acceptable, replace A1 – Power Management PCB Assembly (Dynalec P/N 62413-145). If current is flowing into the battery but, after several hours, the voltage across the battery terminals is not increasing, replace BT1.
Constant display of sensor failure message	Verify that the sensor setting (i.e. SNR) matches the type of sensor connected to the panel and that the proper input terminals on TB2 are being used (i.e. 1 and 2 for ARTD or DRTD, 4 and 5 for 1PIN or 5PIN). For RTD-type sensors, confirm the correct polarity has been observed. If a pinwheel sensor is being used, and the airflow is too low to spin the pinwheel, the "**SNR FAIL**" message will remain. If this is not the problem, confirm the connections between the sensor and the unit. Then, confirm the connection between terminals 4 and 5 of TB2 and terminals 22 and 14 of A1J1, respectively. Connect the – lead of a DC meter to the – terminal of A1C3. Connect the + meter lead to terminal 4 of A1J2. Confirm that, with the pinwheel sensor spinning, a voltage of approximately +2-3VDC is obtained. If this voltage is not obtained, replace A1 – Power Management PCB Assembly (Dynalec P/N 62413-145). If this voltage is obtained, move the + meter lead to terminal 14 of A2U21 and, again, confirm the +2-3VDC voltage. If this voltage is not obtained, check the connection of the PINWHEEL INPUT line in the W2 cable assembly between A1 and A2. Replace W2 if necessary. If sensor connections to the unit are acceptable, confirm the connection between terminals 1 and 2 of TB2 and terminals 17 and 21 of A1J1, respectively. Then, confirm the connection between terminals 1 and 2 of TB2 and terminals 8 and 6 of A1J2, respectively.

	If this connection is not acceptable, replace A1 – Power Management PCB Assembly (Dynalec P/N 62413-145). If connections are acceptable, confirm the connection between terminal 2 of TB2 and terminal 7 of A2U16. If this connection is not present, confirm the terminal 7 of A2U16 is connected to terminal 6 of A2J4. Check the connection of the RTD INPUT line in the W2 cable assembly between A1 and A2. Replace W2 if necessary. If all connections have been confirmed as acceptable, replace the sensor.
Constantly active audible alarm (SILENCE button has no effect)	Check input power leads for ground fault condition (short to hull). Check W1 cable assembly for shorts to chassis. Specifically, check the ALARM – (white lead) for a short to chassis. Replace A2 – Processor Board PCB Assembly (Dynalec P/N 62413-140).
AUX INIT Message on power-up	Check input power wiring for intermittent connection. Replace A2 – Processor Board PCB Assembly (Dynalec P/N 62413-140).
Connected Tri-State Alarm (IC/SM Alarm) remains active with no alarm condition	Confirm that an additional 6.8K supervisory resistor has not been added across Tri-State Alarm terminals (supervisory resistor is part of relay assembly). The addition of 1 (or more) supervisory resistors across the Tri-State Alarm terminals of TB2 or a short in R1 or R2 will result in a sufficient enough current draw from the alarm switchboard to trigger an alarm condition. Confirm that TRI-STATE ALARM line in W3 cable assembly is not shorted to the unit chassis. Connect the + lead of a DC meter to the + terminal of A2C12. Connect the – lead of the meter to pin 5 of A2U8. Confirm that a voltage of approximately 0VDC is obtained. If not, replace A2 – Processor Board PCB Assembly (Dynalec P/N 62413-140). If this voltage is present, connect the + lead of the meter to pin 17 of A1J1. Connect the – lead of the meter to the middle leg of A1Q1. Confirm that a voltage of approximately 0VDC is obtained. If the voltage is not present, confirm the connection of the TRI-STATE ALARM – RELAY CONTROL OUT line in the W2 cable assembly between A1 and A2. Replace this cable if necessary. If the voltage is present, move the – meter lead to pin 11 of A1J1. Confirm that a voltage of approximately +0VDC is obtained. If not, replace A1 – Power Management PCB Assembly (Dynalec P/N 62413-145). If the voltage is present, confirm the connections between W3P1 pin 11 and K2 pin 7. Also confirm the connections between K1, K2, and CR2. If these connections are acceptable, replace K2.

Inaccurate/Null Analog Output	Check for continuity between terminal 16 of A2U22 and terminal 5 of A2J4. If no continuity, replace A2 – Processor Board PCB Assembly (Dynalec P/N 62413-140). Check for continuity between terminal 16 of A2U22 and terminal 5 on A1J2. If no continuity, check the ANALOG OUT line in the W2 cable assembly between A1 and A2. Replace W2 if necessary. Check for continuity between terminal 16 of A2U22 and terminal 23 of A1J1. If no continuity, replace A1 – Power Management PCB Assembly (Dynalec P/N 62413-145). Check for continuity between terminal 16 of A2U22 and terminal 1 of TB1. If no continuity, check the ANALOG SIGNAL OUT line connected to terminal 23 of W3P1. Replace W3 if necessary. Check for a short between terminal 16 of A2U22 and the unit chassis.
Connected External Alarm remains active with no alarm condition	Disconnect W2P4 from A2J4. If External Alarm remains active, check for a short circuit condition between the EXT ALARM – 115VAC line of W2 (connected to terminal 9 of W2P4) and the unit chassis. If no short circuit condition exists, connect the + lead of a DC meter to the + terminal of A2C12. Connect the – lead of the meter to pin 3 of A2U8. Confirm that a voltage of approximately 0VDC is obtained. If not, replace A2 – Processor Board PCB Assembly (Dynalec P/N 62413-140).
Connected AC Alarm (External Bell) remains active with no alarm condition	Repeat the procedure above for “Connected External Alarm remains active with no alarm condition”. If no short circuit condition exists and the proper voltage is measured at pin 3 of A2U8, replace K3.

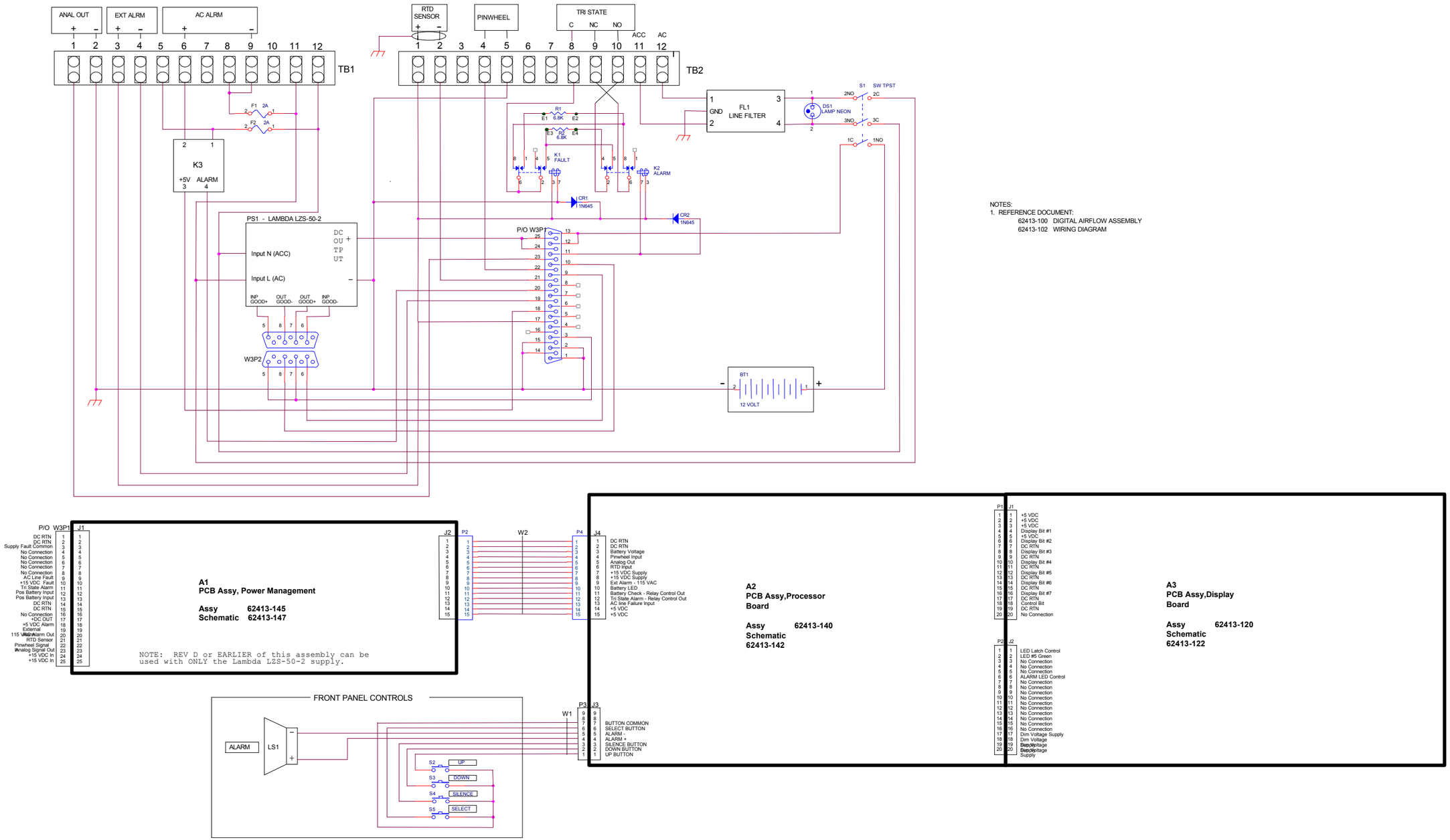


Figure 8A. System schematic using LZS-50-2 Lambda Power Supply (Dynalec P/N 62413-155)

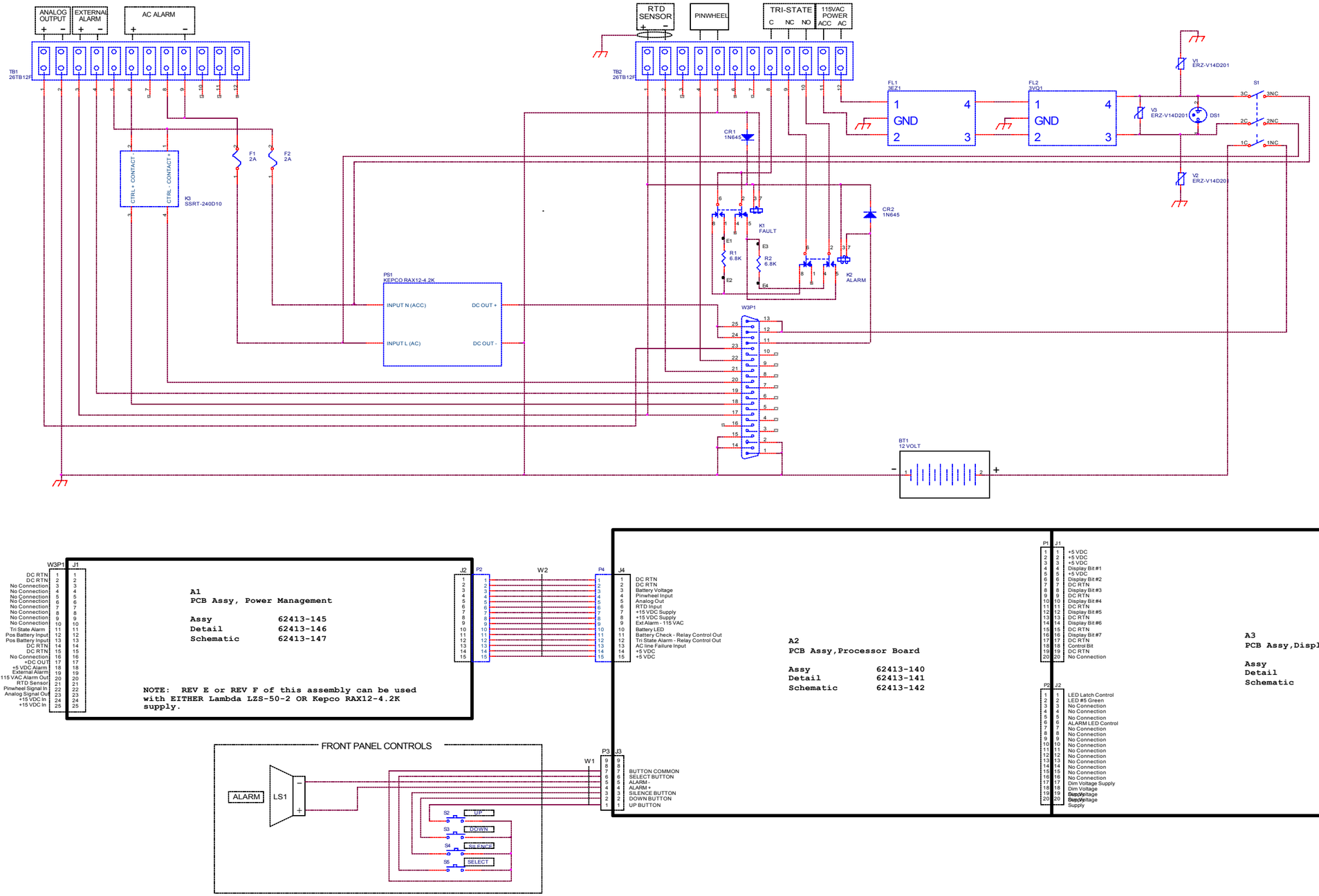


Figure 8B. System schematic using RAX12-4.2K Kepco Power Supply (Dynalec P/N 62413-166)

Parts List

This chapter contains:

- A list of parts you may need to reorder
- Diagrams of the front panel, front and rear views of the internal boards, and bottom view of the panel, showing part placement.

Reference Designation	Name and Description	Figure Number (Item)
A3	PCB Assembly, Display Board Mfr 12763 Dwg 62413-120	See Ref
A2	PCB Assembly, Processor Board Mfr 12763 Dwg 62413-140	See Ref
A1	PCB Assembly, Power Management Board Mfr 12763 Dwg 62413-145	See Ref
LS1	Sonalert, 2-12V, 82-103 DBA, 29 KHZ Mfr 56493 Part XC-09-212-S Dwg 62413-109	See Ref
	Lens, LED, Panel Mount, Red Mfr 91802 Part 4341 Dwg 14101-070	(5)
	Lens, LED, Panel Mount, Yellow Mfr 91802 Part 4347 Dwg 14101-071	(6)
TB1, TB2	Terminal Board Mfr 81349 Part 26TB12F Dwg 14088-005	See Ref
PS1	Power Supply, 15V, 3.4A @ 60C Mfr 80103 Part LZS-50-2 (obsolete) Dwg 62413-155 Mfr 85604 Part RAX12-4.2K (alternate) Dwg 62413-166	See Ref
BT1	Battery, 12V, 3.2 AH, 8”?2”?3” Mfr 15546 Part PS-1252 Dwg 62413-161	See Ref
S2, S3, S4, S5	Switch, PCB, MOM, SP, Panel Mount, 120H Mfr 63426 Part SB4011NOH-E- Dwg 14122-405	See Ref
W1	Cable Assembly A, Panel to Processor PCB Mfr 12763 Dwg 62413-163	See Ref

Reference Designation	Name and Description	Figure Number (Item)
W2	Cable Assembly B, Processor PCB to Power Mgmt PCB Mfr 12763 Dwg 62413-165	See Ref
W3	Cable Assembly C, Power Mgmt PCB to Terminal Board Mfr 12763 Dwg 62413-167	See Ref
FL1	Power Line Filter, 120 VAC, 3A, 10K Mfr 05245 Part 3EZ1 Dwg 14108-036	See Ref
FL2	Power Line Filter, 120 VAC, 3A, 10K Mfr 05245 Part 3VQ1 Dwg 14108-037	See Ref
K3	Hockey Puck Solid-State Relay Mfr 77342 Part SSRT-240D10 Dwg 14102-077	See Ref
XF1, XF2	Fuse Holder Mfr 81349 Part FHL 17G1 Dwg 14049-003	See Ref
F1, F2	Fuse, Cart. 2A, 250V Mfr 81349 Part F03B250V2A Dwg 14050-028	See Ref
XDS1	Indicator Light Mfr 72619 Part LH74/1LC13CN2 Dwg 14101-002	See Ref
DS1	Lamp, Glow Neon C7A (NE-2D) Mfr 81349 Part M15098/11-001 Dwg 16053	See Ref
S1	Switch – 3 PDT Toggle Mfr 8S746 Part 8B3011A Dwg 14124-001-01	See Ref
	Relay Assembly Mfr 12763 Dwg 62413-117	(105)
	Plate, Terminal Tube Mfr 12763 Dwg 62413-024-1	(7)
	Spacer, Power Supply Mfr 12763 Dwg 62413-132	(11)
	Enclosure Mfr 12763 Dwg 62413-015-1	(15)
	Plate Mounting Mfr 12763 Dwg 62413-118	(16)
	Bracket Support, Power Supply Mfr 12763 Dwg 62413-135	(17)
	Bracket, Power Supply Mfr 12763 Dwg 62413-137	(18)

Reference Designation	Name and Description	Figure Number (Item)
	Frame, Window Mfr 12763 Dwg 62413-127	(20)
	Enclosure, Battery Hold Down Mfr 12763 Dwg 62413-138	(23)
	Screw, Hex, ¼-20 x 1.00 (mod) Mfr 12763 Dwg 62413-027	(26)
	Gasket, Cover Mfr 18565 Part 07-0101-0300 Dwg 62413-153	(27)
	Name Plate Mfr 12763 Dwg 62413-031	(29)
	Label, Caution 5/8"x 1-1/2" Mfr 85480 Part W0-11 Dwg 61722-047	(33)
.	Bracket, Terminal Board Mounting Mfr 12763 Dwg 62413-133	(34)
	Shield Mfr 12763 Dwg 62413-134	(35)
	Frame, Screen Vent Mfr 12763 Dwg 62413-158	(41)
	Standoff, Hex, 1/4" x 1/2", #6 Mfr 06540 Part 8215-SS-0632-7 Dwg 12520-436	(42)
	Washer, Flat #8 .375 OD .049 thick Mfr 96906 Part MS15795-807 Dwg 12211-007	(43)
	Screen, Vent Mfr 12763 Dwg 62413-157	(44)
	Washer, Lock #8 .040 thick Mfr 96906 Part MS35338-137 Dwg 12203-004	(45)
	Screw, MACH-PNH XREC, 6-32 x 1/2 Mfr 96906 Part MS51957-30 Dwg 12119-003	(46)
	Standoff, Male/Female, #6-32 Mfr 12763 Dwg 62413-156	(47)
	Standoff, Hex 1/4" x 3/8", #6-32 Mfr 06540 Part 8213-SS-0632-7 Dwg 12520-428	(48)
	Standoff, 1/4 Hex #6 15/16 Mfr 12763 Dwg 62413-162	(49)

Reference Designation	Name and Description	Figure Number (Item)
	Screw, MACH-PNH XREC, 4-40 x 3/8 Mfr 96906 Part MS51957-15 Dwg 12108-002	(50)
	Screw, MACH-PNH XREC, 6-32 x 5/16 Mfr 96906 Part MS51957-27 Dwg 12119-022	(51)
	Screw, MACH-PNH XREC, 8-32 x 3/8 Mfr 96906 Part MS51957-43 Dwg 12130-002	(52)
	NUT, PL, Hex 4-40 .093 thick Mfr 96906 Part MS35649-244 Dwg 12301-002	(53)
	Screw, MACH-PNH XREC, 1/4 -20 x 1/2 Mfr 96906 Part MS51957-79 Dwg 12193-003	(54)
	Washer, Flat ¼ Mfr 81349 Part AN960C-416 Dwg 12213-007	(55)
	Washer, Flat #4 .312 OD Mfr 96906 Part MS15795-804 Dwg 12211-004	(56)
	Washer, Flat #6 .375 OD Mfr 96906 Part 5795-806 Dwg 12211-006	(57)
	Screw, MACH-PNH XREC 8-32 x 1/2 Mfr 96906 Part MS51957-45 Dwg 12130-003	(58)
	Washer, Flat 1/4 .734 OD Mfr 96906 Part 5795-811 Dwg 12211-011	(59)
	Washer, Lock #4 .025 thick Mfr 96906 Part MS35338-135 Dwg 12203-002	(60)
	Washer, Lock #6 Mfr 96906 Part MS35338-136 Dwg 12203-003	(61)
	Gasket, Terminal, Tube Plate Mfr 18565 Part 07-0101-0377 Dwg 62413-154	(62)
	Washer, Lock ¼ Mfr 96906 Part MS35338-139 Dwg 12203-006	(63)

Reference Designation	Name and Description	Figure Number (Item)
	Nut, PL, Hex 6-32 .108 thick Mfr 96906 Part MS35649-264 Dwg 12301-003	(64)
	Washer, Lock, EXT. No. 6 Mfr 96906 Part MS35335-58 Dwg 12202-003	(65)
	PH Screw, SS XREC, M4-.7 x 8MM Dwg 62413-160	(71)
	PH Screw, SS XREC, M4-.7 x 10MM Dwg 62413-159	(72)
	Washer .156 ID x .375 OD x .090 Mfr 12763 Dwg 12215-018	(100)
	Standoff, Hex .25 x 3.000 6-32 Mfr 12763 Dwg 12520-840	(101)
	Standoff, Hex .25 x 1.531 6-32 Mfr 12763 Dwg 12520-841	(102)
	Designation Plate Mfr 12763 Dwg 62413-150	(103)
	Designation Plate Mfr 12763 Dwg 62413-151	(104)
	Pad, Audio/Logic Board Mfr 12763 Dwg 61690-449	(107)

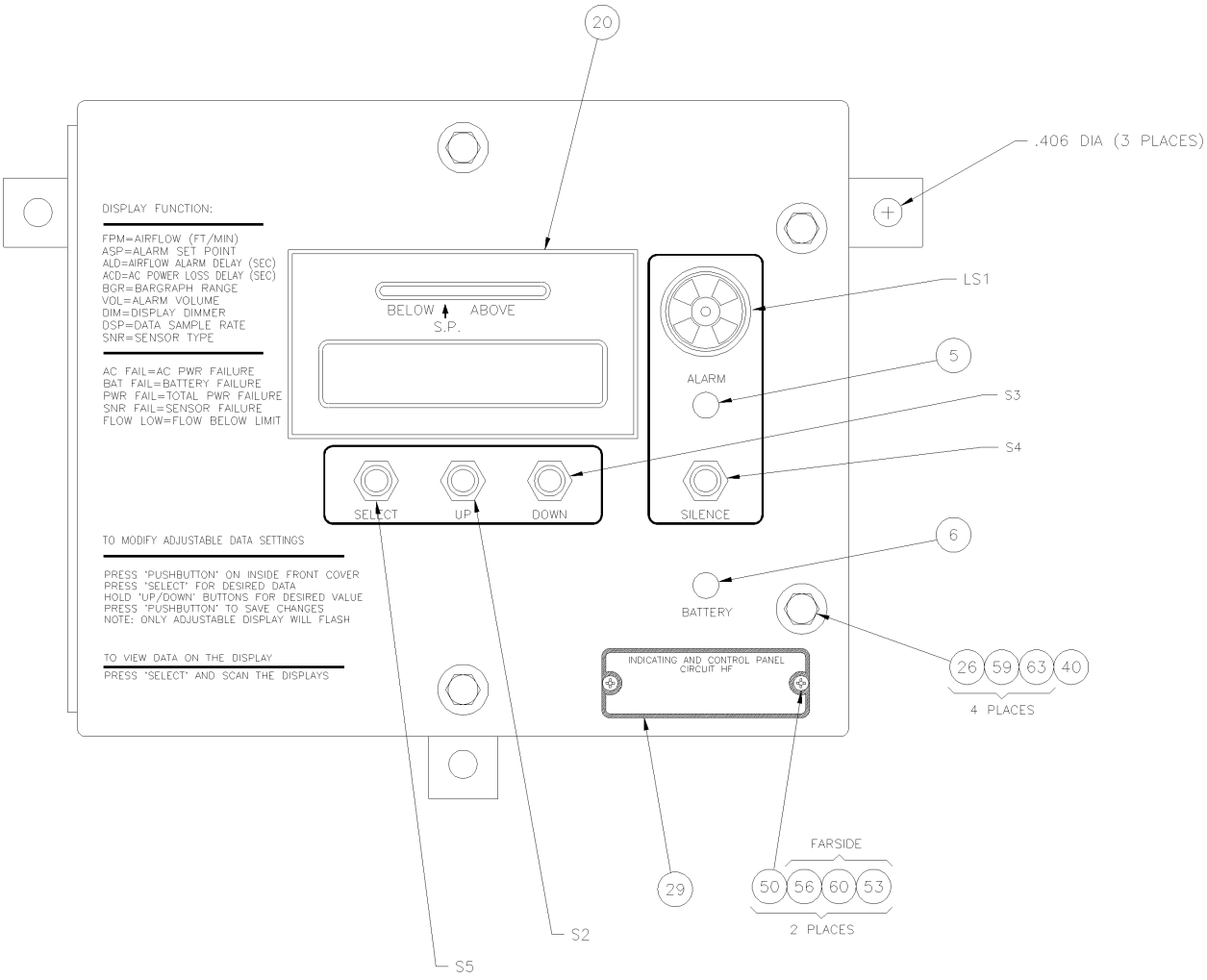


Figure 9. Front panel

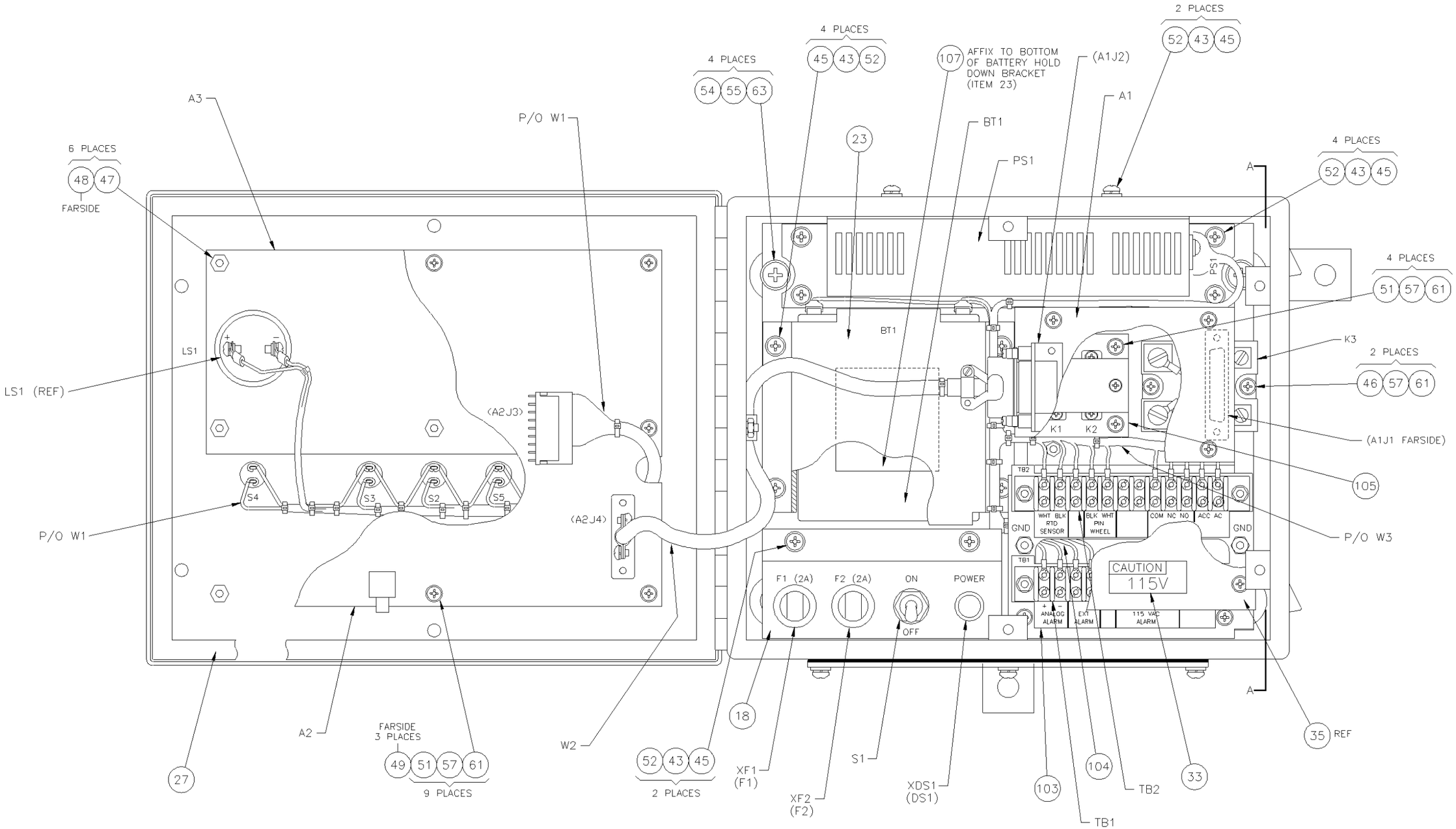


Figure 10. Front view, Airflow Indicator Panel (cover open)

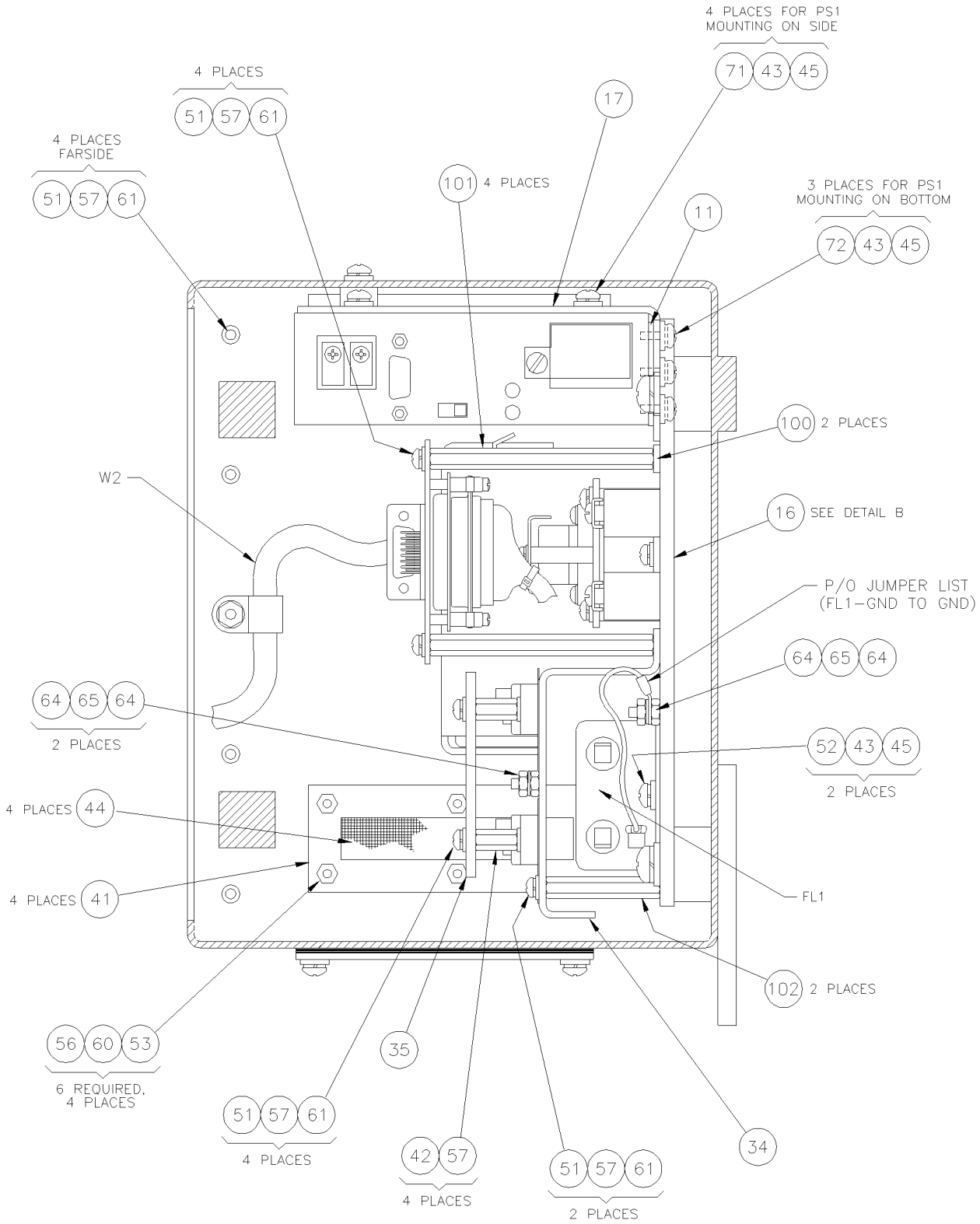


Figure 11. A-A sectional view, Airflow Indicator Panel

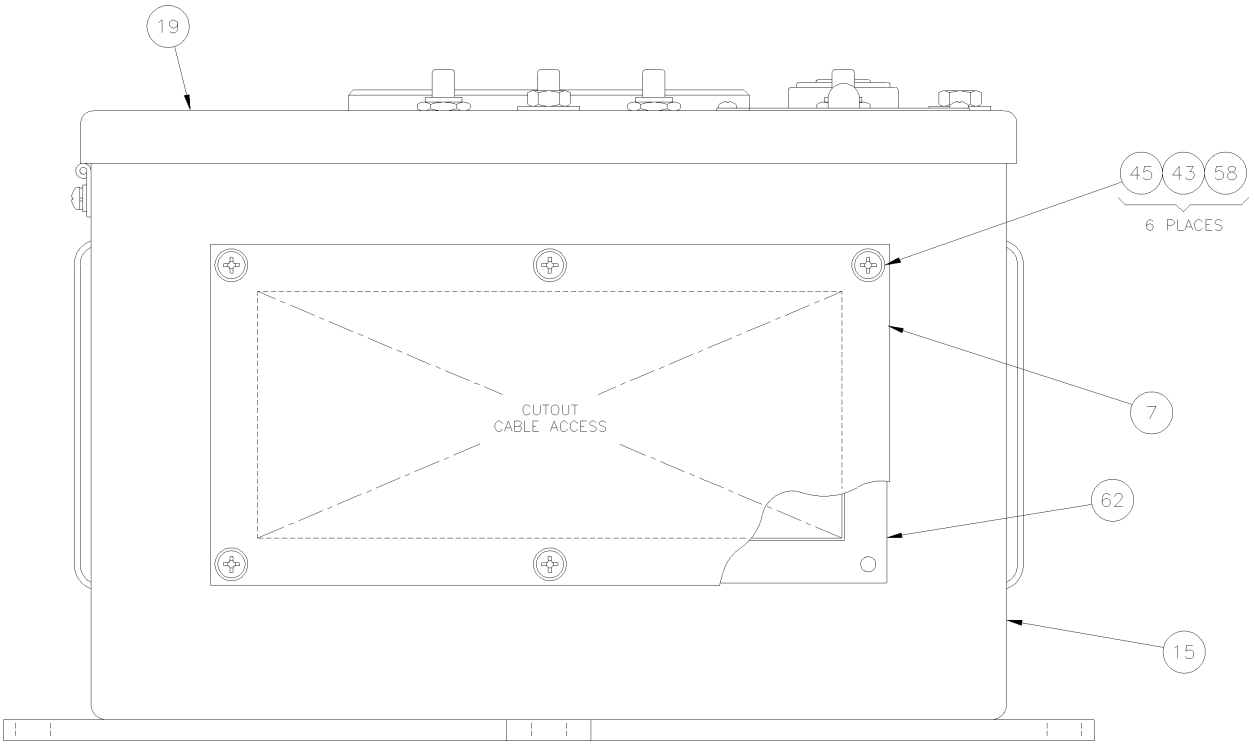


Figure 12. Bottom view, Airflow Indicator Panel

Installation

This chapter contains procedures for mounting, installing, and turning on the Airflow Indicator Panel.

The procedures for installing the Airflow Indicator Panel are:

1. Mount the unit.
2. Hook up input and output wires.
3. Turn the unit on.

Mounting the unit

See figure 13 for mounting dimensions.

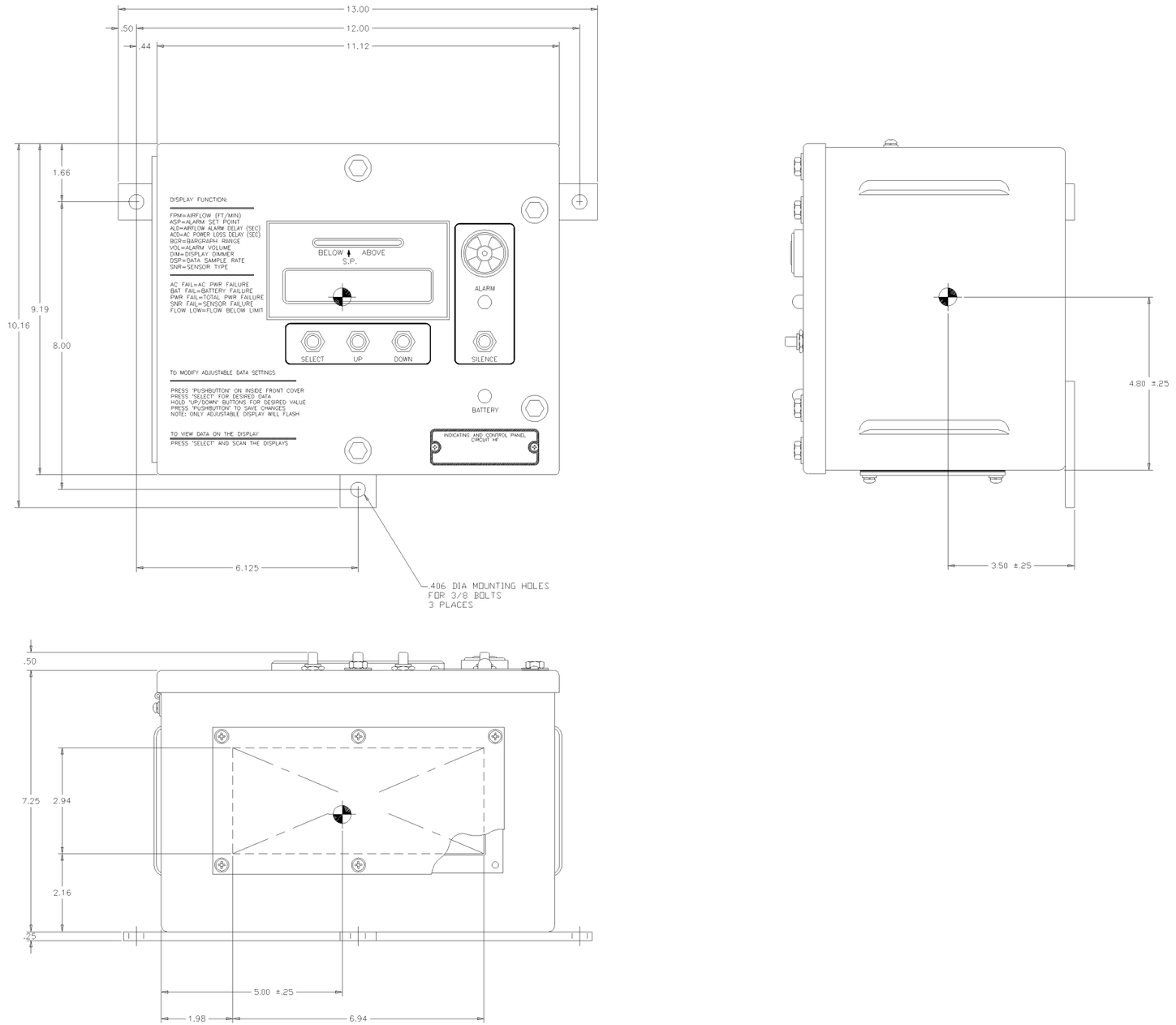


Figure 13. Mounting diagram

Hooking up input and output wires

Use the diagram below as a guide to hooking up:

1. RTD or pinwheel sensor (TB2-1 and -2, or TB2-4 and -5)

2. AC input (TB2-11 and -12).

The other hookups are optional.

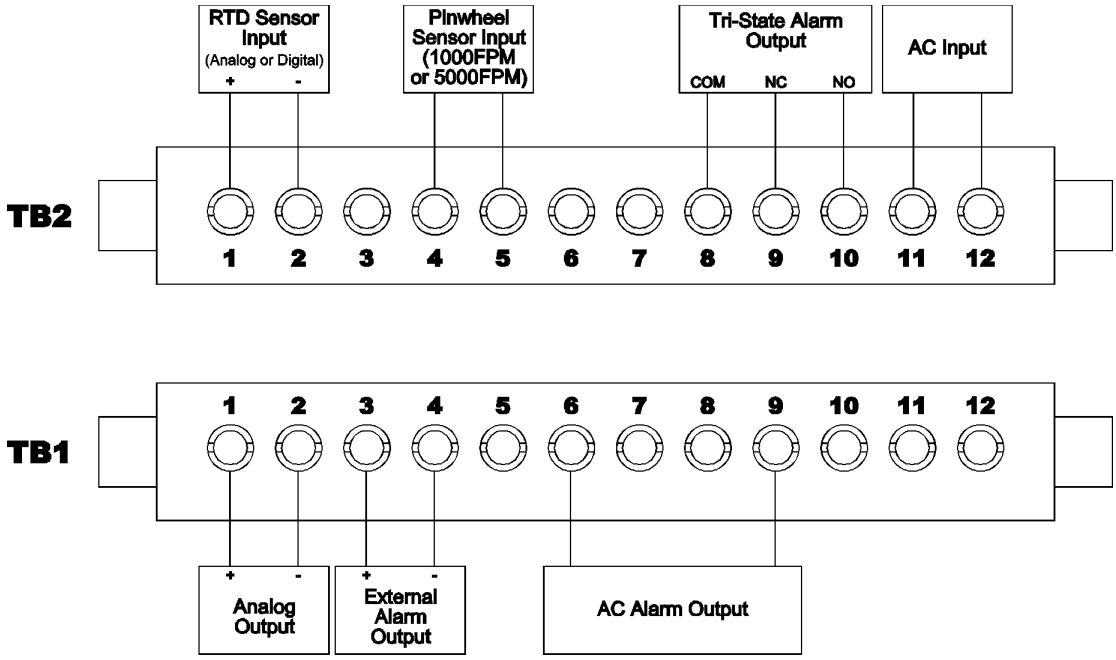


Figure 14. Hookup diagram

Turning the unit on

The POWER indicator inside the unit (DS1) is illuminated when AC input power is present at terminal block TB-2. The ON/OFF toggle switch (S1) next to the POWER indicator activates/deactivates all power to the system.